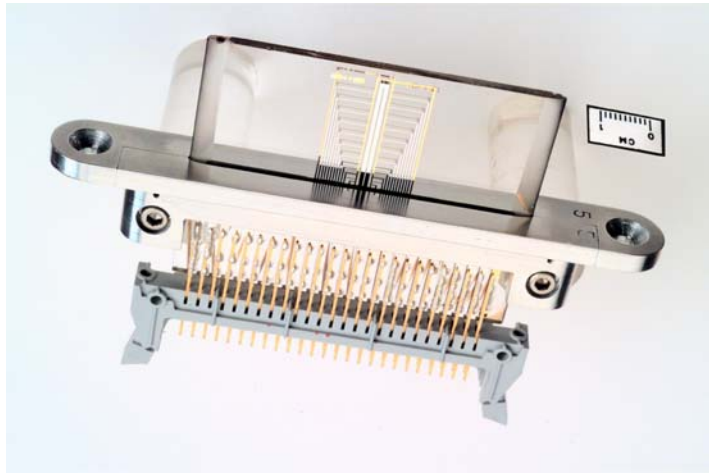
NASA Glenn Success Stories

Thermocouple Boundary Layer Rake

Makel Engineering, Inc.

TECHNOLOGY

The Thermocouple Boundary Layer Rake is an innovative flow-measuring device that can detect flow by using a thin film thermocouple (TC) array to measure the temperature difference across a heater strip. The heater and TC arrays are micro-fabricated on a constant thickness quartz strut with low heat conductivity. The device can measure the velocity profile well into the boundary layer, within about 65 microns from the surface. This is about 4 times closer to the surface than has been possible with the previously used total pressure tube.



Large size thermocouple boundary layer rake

COMMERCIAL APPLICATION

◆The TC Rake is a research tool for measuring the flow characteristics within a boundary layer. This tool may be useful to government, college, and industry researchers.

◆Makel Engineering, Inc. is interested in applying this technology to measure the mass flow rate in the intake manifold of a diesel engine perhaps for measuring fluid viscosity

SOCIAL / ECONOMIC BENEFIT

◆Research done to measure boundary layer flows inside an airplane engine or on the surface of an airplane can improve efficiency.

◆The TC rake may also be able to measure turbulence and flow rate through a duct.

NASA APPLICATIONS

◆ This device can be used by NASA in wind tunnel tests.

◆ NASA is applying another patent entitled, “Resistance Temperature Detector Bridge Flow Sensor,” using a similar arrangement.

NASA Contact: Dr. Danny Hwang / Mr. Gus Fralick
Company Contact: Dr. Darby Makel